

## RESPONSE OF CARAWAY YIELD TO PLANT DISTANCE AND NITROGEN FERTILIZATION TREATMENTS

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### ABSTRACT

Two field experiments were carried out at the Agricultural Experiment and Research Station, Faculty of Agriculture, Cairo University, during the 2006-2007 and 2007-2008 seasons to study the effect of plant distance and nitrogen fertilization on the yield of caraway (*Carum carvi* L.). Plant distance treatments were 20, 40 and 60 cm. Nitrogen fertilization treatments were 0, 10, 20, 30, 40 and 45 kg N/feddan. The results indicated that the maximum values for plant height were obtained when the distance was 20 cm between the plants, while for the number of branches/plant, the number of umbels/plant, fruit weight/plant (gm), fruit yield/plot (gm), fruit yield/feddan (kg), 1000 seeds weight (gm), oil% and oil yield/feddan (L) the maximum values were obtained when the distance was 60 cm between the plants. Also, the results indicated that the maximum values for plant height, number of branches/plant, number of umbels/plant, fruit weight/plant (gm), fruit yield/plot (gm), fruit yield/feddan (kg), weight of 1000 seeds (gm), oil% and oil yield/feddan (L) were obtained with applying 40 kg of nitrogen/feddan. Interaction between plant distance and nitrogen fertilization resulted in the maximum values of fruit yield/feddan with the distance of 40 cm between plants and applying 40 kg nitrogen/feddan.

**Key words:** *caraway, Carum carvi, distance, nitrogen fertilizer.*

### 1. INTRODUCTION

Medicinal and aromatic plants are very important economic plants. Nowadays, there is a return to the use of natural products in pharmaceuticals and cosmetics. Caraway (*Carum carvi* L.), a member of the Umbelliferae (Apiaceae), is an annual spice crop. It has an erect, branched stem. The plant forms a shallow tap root with minimal branching. White flowers are formed at the terminal buds. The oil content and composition are influenced by crop maturity, cultivar and growing conditions. Fertilizers are chemical compounds applied to promote plant growth and fruit production. This application is either through the soil (for uptake by plant roots) or sprayed on the foliage of the plant. The distance of planting affects the vegetative growth. Radwan (1980) mentioned that there was a significant decrease in caraway plant height with increasing plant spacing. Badran and Hafez (2002) indicated that reducing *Nigella sativa* plant density caused considerable increase in each of branch number, herb dry weight as well as fruit yield/plant, while plant height and fruit yield/feddan were greatly reduced. Planting distance affects the essential oil yield. Radwan (1980) obtained an increase in

caraway oil yield/plot as a result of growing the plants at a distance of 20 cm. Ahmed (1997) found that the volatile and fixed oil percentages in the seeds of *Nigella sativa* were increased with increasing the distance between the plants up to 40 cm. The vegetative growth and herb yield are affected with nitrogen fertilizers. Radwan (1980) found that the plant height, number of branches, umbels/plant and fresh and dry weights of coriander and caraway were increased as the levels of nitrogen increased. As regards to the effect of nitrogenous fertilizers on oil yield, Rahman *et al.* (1990), Barreyro *et al.* (1993) and Hussien (1995) found that increasing nitrogenous fertilization for *Coriandrum sativum* increased essential oil yield. Bhati and Shaktawat (1994) and Tiwari and Banafar (1995) stated that the application of 60 kg nitrogen/ha increased the essential oil yield of coriander plant.

The objective of the present study was to find out the effect of plant distance and nitrogen fertilization treatments on the yield of caraway.

### 2. MATERIALS AND METHODS

Two field experiments were carried out at the Agricultural Experiment and Research Station,